

## SCOPE OF WORK

### **Analysis of Seagrass Roots and Rhizomes for Non-Structural Carbohydrates**

This procurement is for the analysis of seagrass (*Thalassia testudinum*) root, rhizome and leaf samples to determine total nonstructural carbohydrates (starch, total soluble sugars, and individual soluble sugars). The samples were collected beginning in June 2002 and will continue to be collected through November 2004. The samples will be approximately 0.2 g of dried, ground plant material. There will be a minimum of 297 and maximum of 335 total samples. Sample quantities above the minimum will be ordered at the discretion of the government. Each sample will require two separate analyses for (i) starch and (ii) total soluble sugars and individual sugars. Samples will be shipped to the contractor through December 2004. The contractor will be responsible for digestion, extraction/filtration and analyte analysis. The successful contractor shall have demonstrated experience in the analysis of carbohydrates in plant material and shall employ methods and detection limits equivalent to those utilized by the references provided herein. The period of performance will be from date of award through March 1, 2005.

The submitted proposal shall include a written QA Management Plan (QMP) equivalent to the EPA's requirement document (EPA QA/R-2: EPA Requirements for Quality Management Plans). A written Quality Assurance Project Plan equivalent to the EPA's requirement document [EPA QA/R-5: EPA Requirements for Quality Assurance Project Plans (QAPP) for Environmental Data Operations (category 2)] shall be provided for the Project Officer's review and approval after the award and prior to the analysis of samples. These reference documents can be located at [http://www.epa.gov/quality/qa\\_docs.html](http://www.epa.gov/quality/qa_docs.html). The QAPP shall describe in detail all chemical methods, including expected recovery of all analytes, and all standard operating procedures used in these analyses. The basic minimum criteria include the following quality control samples for every 20 samples analyzed: (i) one laboratory method blank, (ii) laboratory control reference material(s) (equivalent to a certified reference material), and (iii) calibration curve(s). The minimum expected mean recovery efficiencies for non-structural carbohydrates is 95 %. The mean percentage recovery and variance of all analytes of interest and laboratory standard reference materials shall be documented in the QAPP and reported for each batch of samples. Method Detection Limits (MDL) requirements are provided in Table 1. The contractor shall re-analyze (at no additional cost to the Government) an entire batch of samples if (i) recovery results of the spike matrix are deemed unacceptable for the methods utilized or (ii) values for control reference materials differ by 10%. The contractor shall permit QA audit of laboratory and/or data entry procedures by an authorized agent of EPA at any time while conducting the analyses (given advanced notification).

Results shall be reported on the basis of analyte g<sup>-1</sup> dry weight and provided in an electronic form (disc or CD). The contractor shall also provide a hard-copy output of data files (e.g., spreadsheets) for the purpose of quality assurance. A written report detailing the methods used, and the results of QA measures shall also be provided by the contractor. The report is to be submitted to the EPA Project Officer within 60 days after receipt of the samples. Any laboratory notes discussing problems encountered shall be included as an appendix to this report.

The contractor is required to transfer copies of all technical, fiscal, and programmatic files regarding this contract to the Project Officer. These files shall be boxed in accordance with

Federal Record Keeping Standards in boxes required by the Records Center and labeled as “**Analysis of Non-Structural Carbohydrates in Seagrass** - Contractor Name / Contract Number” and contain an internal and external packing slip that identifies the specific contents of each box. The external packing slip shall be affixed to the exterior of the box.

The contractor shall provide EPA with a quote on a per sample basis for each of the contract line items below, based on the number of samples projected for each line item.

#### **Contract Line Item Number (CLIN) One**

The contractor shall perform non-structural carbohydrate analysis for the determination of starch in seagrass root, rhizome and leaf material (297 samples minimum). Optional quantities to the maximum amount (335 samples) may be ordered at the discretion of the government.

#### **Contract Line Item Number (CLIN) Two**

The contractor shall perform non-structural carbohydrate analysis for the determination of total and individual soluble sugars in seagrass root, rhizome and leaf material (297 samples minimum). Optional quantities to the maximum amount (335 samples) may be ordered at the discretion of the government.

#### **REFERENCES**

Townsend, R.R., M.R. Hardy, O. Hindsgaul and Y.C. Lee. 1988. High-performance anion-exchange chromatography of oligosaccharides using pellicular resins and pulsed amperometric detection. Anal. Biochem. 174:459-470.

Wilson, R., A. Cataldo and C.P. Anderson. 1995. Determination of total nonstructural carbohydrates in tree species by high-performance anion-exchange chromatography with pulsed amperometric detection. Can. J. Forest Res. 25: 2022-2028.

**Table 1. HPAEC-PAD Method Detection Limits (MDLs) required for expected nonstructural carbohydrate analyses in seagrass root and rhizome samples.**

<b><u>Carbohydrate</u></b>	<b><u>MDL (ppb)</u></b>
<b>sugar alcohols</b>	<b>30</b>
<b>monosaccharides</b>	<b>30</b>
<b>oligosaccharides</b>	<b>100</b>
<b>starch</b>	<b>100</b>